Fertility Decline and Contraceptive Use Inequality in Egypt: Decomposition Analysis

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Abstract: *The current paper is an attempt to examine and measure inequalities in low fertility and current contraceptive utilization in Egypt. This is done through using Wagstaff decomposition to identify the causes' contributions of socioeconomic inequality in low fertility and current contraceptive use. The 2014 Egypt Demographic and Health Survey (EDHS) provides the data for this study. The decomposition analysis of this paper reveals that household wealth, mother's education, and place of residence were the most significant factors contributing to socioeconomic inequality in low fertility and current contraceptive utilization in Egypt. Our findings suggest that policy interventions aimed at improving household economic conditions and increasing women's education have contributed to reducing inequality in contraceptive use and declining fertility in Egypt.*

Keywords: Inequality, Contraceptive use, Fertility, Socioeconomic, Decomposition, Egypt

1. Introduction

One of the targets of the Sustainable Development Goals is to guarantee universal access to reproductive rights for all. Access to services of family planning enables individuals to plan and manage their reproductive health, resulting in desired family size and birth spacing. This contributes to better maternal and child health, fewer unintended pregnancies, and progress towards Sustainable Development Goal 3 [18].

Although access to contraception is essential for progress on Sustainable Development Goals 3 and 5, numerous barriers continue to impede women's ability to obtain contraceptive methods [7]. Globally, an estimated 966 million women of reproductive age (15–49 years) used any method of contraception in 2021. Despite this, 164 million women worldwide still have an unmet need for family planning, meaning they desire to delay or stop childbearing but are not currently using any method of contraception [19].

Globally, modern contraceptive use increased by 188 million women between 2000 and 2020. However, this progress varies among regions. For example, above 80 percent women of reproductive age (15–49 years) in many developed countries used any method of contraception while this percentage decreased to 50 percent in sub-Saharan Africa [18].

Building on our prior research on determining degree of the socioeconomic inequalities in fertility and contraception use in Egypt [5], this study expands on that work. The current paper employs decomposition analysis to identify the independent factors that most significantly contribute to these inequalities, particularly regarding current contraceptive use and declining fertility among Egyptian women.

2. Data Source

The 2014 Egypt Demographic and Health Survey (EDHS) is a valuable resource for family planning research in Egypt. It includes detailed data on women's birth histories, contraceptive use, and household demographics. This information, gathered through interviews with over 21,762 women (with a remarkable 99.4% response rate), allows for in-depth analysis of factors affecting contraceptive use. This study focused on a subset of 7,896 mothers whose last childbirth occurred within the five years prior to the survey.

3. Methodology

This study examined two key factors related to family planning in Egypt: fertility rate and contraceptive use. Fertility rate variable was determined by the total number of children a woman reported having ever given birth to. Women were then categorized as having either low fertility (less than 3 children) or high fertility (3 or more children). Contraceptive use variable was analyzed based on the women's responses to the question "Current contraceptive method." Their answers were simplified into two categories: "used a method of contraception" and "never used any method of contraception." Our current paper attempts to indicate the relative share of socioeconomic determinants to inequalities in current contraceptive use and declining fertility among Egyptian women by using Wagstaff decomposition

A decomposition analysis illustrates how independent variables proportionally contribute to inequality in dependent variable. The concentration index (CI) can be written as:

$$CI = \sum_{k=1}^{m} \left(\frac{\beta^{m}_{k} \bar{X}_k}{\mu} \right) CI_{X_k, R_i} + \frac{GCI_{\varepsilon_i}}{\mu}$$

$$CI = \sum_{k=1}^{m} \eta_k CI_k + \frac{GCI_{\varepsilon_i}}{\mu}$$

$$Where, \eta_k = \frac{\beta^{m}_{k} \bar{X}_k}{\mu}$$

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Where μ is the mean of the dependent variable. $\overline{x}_k$ is the mean of x_k; β^m_k is the coefficient of determinant k and CI_k is the concentration index for x_k. η_k is the elasticity of x_k. In the last term (which can be computed as a residual), GC_ε is the generalized concentration index for ε_i [20].

4. Results

Table (1) presents the results of the decomposition of the inequalities in current contraceptive method use by inequalities in its determinants. The table shows the coefficient of determinants (β^m_k) obtained from marginal effect model, the mean of each determinant ($\overline{x}_k$), the elasticity $\left(\dfrac{\beta^m_k\, \overline{x}_k}{\mu}\right)$, the concentration index for determinants (CI_k), the shares of determinates ($\left(\dfrac{\beta^m_k\, \overline{x}_k}{\mu}\right)CI_k$) and percentage shares of determinants. The elasticity is a unit-free index of correlation that illustrates the degree of change in dependent variable (current contraceptive method use) associated with one unit change in independent variable [14].

The concentration index measures the unequally distribution of different variables by households' economic status. The negative values of concentration index illustrate that inequality is more concentrated among the poor households and vice versa. The concentration index of current contraceptive usage equals 0.117 which means that current contraceptive method use is more concentrated among the rich households (pro-rich inequality). The concentration index values of independent variables indicated that mother with no education and primary education, poorest, poorer and middle households, total children ever born and currently pregnant all were highly concentrated among households of lower economic status. Although, the concentration index values of rich households, working mother, women empowerment and low fertility all were highly concentrated among households of higher economic status.

The percentage share means if the value of the percentage share of variable K is *k* and positive (negative), then the inequality in current contraceptive method use would decrease (increase) by k% if the variable were to become equally distributed across the socio-economic

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households [9]. In 2014, the highest share to socioeconomic inequality in current contraceptive method use was due to households' economic status (88%) which means if income were equally distributed among households belonging to different socioeconomic groups, then inequality in current contraceptive method use would decline by 88%. Furthermore, mother's education (30%), urban residence (22%) and women empowerment (11%) revealed notable shares to socioeconomic inequality in current contraceptive method use. Working mother (1.3%) also proved less prevalent shares to the measured inequality.

Table (1): Decomposition results of inequality in current contraceptive method use in Egypt, EDHS 2014

Variable	β^m_k	CI_k	$\overline{x}_k$	elasticity	share	% share
Urban Residence	0.029	0.635	0.380	0.017	0.011	22
Mother's education (Higher[a])						
No education	-0.060	-0.619	0.253	-0.023	0.014	30
Primary	-0.011	-0.216	0.102	-0.002	0.000	0.8
secondary	0.000	0.247	0.515	0.000	0.000	0.0
Sum						30
Household economic status (Richest[a])						
Poorest	-0.116	-0.999	0.193	-0.034	0.034	71
Poorer	-0.093	-0.519	0.197	-0.028	0.015	30
Middle	-0.054	-0.012	0.210	-0.017	0.000	0.4
Richer	-0.042	0.512	0.206	-0.013	-0.007	-14
Sum						88
Current Mother's age	-0.001	0.009	28.52	-0.023	0.000	-0.4
Total children ever born	0.023	-0.079	2.67	0.096	-0.008	-15.6
Currently pregnant	0.001	-0.055	0.09	0.000	0.000	0.0
Working mother	0.011	0.312	0.12	0.002	0.001	1.3
Women empowerment	0.015	0.299	0.74	0.018	0.005	11
Low Fertility	-0.126	0.166	0.546	-0.106	-0.018	-36
CI of current contraceptive method use					0.117	

[a] Reference category   Source: Calculated by author from EDHS 2014

Figure (1) shows the different shares of the inequality in the determinants of current contraceptive method use in 2014. This Figure reveals that the highest shares to socioeconomic inequality in current contraceptive method use are belonging to households' economic status (88%), mother's education (30%), urban residents (22%) and women empowerment (11%). In contrast, low fertility and total children ever born contributed negatively to inequality of current contraceptive method use.

Figure (1): Socioeconomic determinants of inequality in using Contraceptive
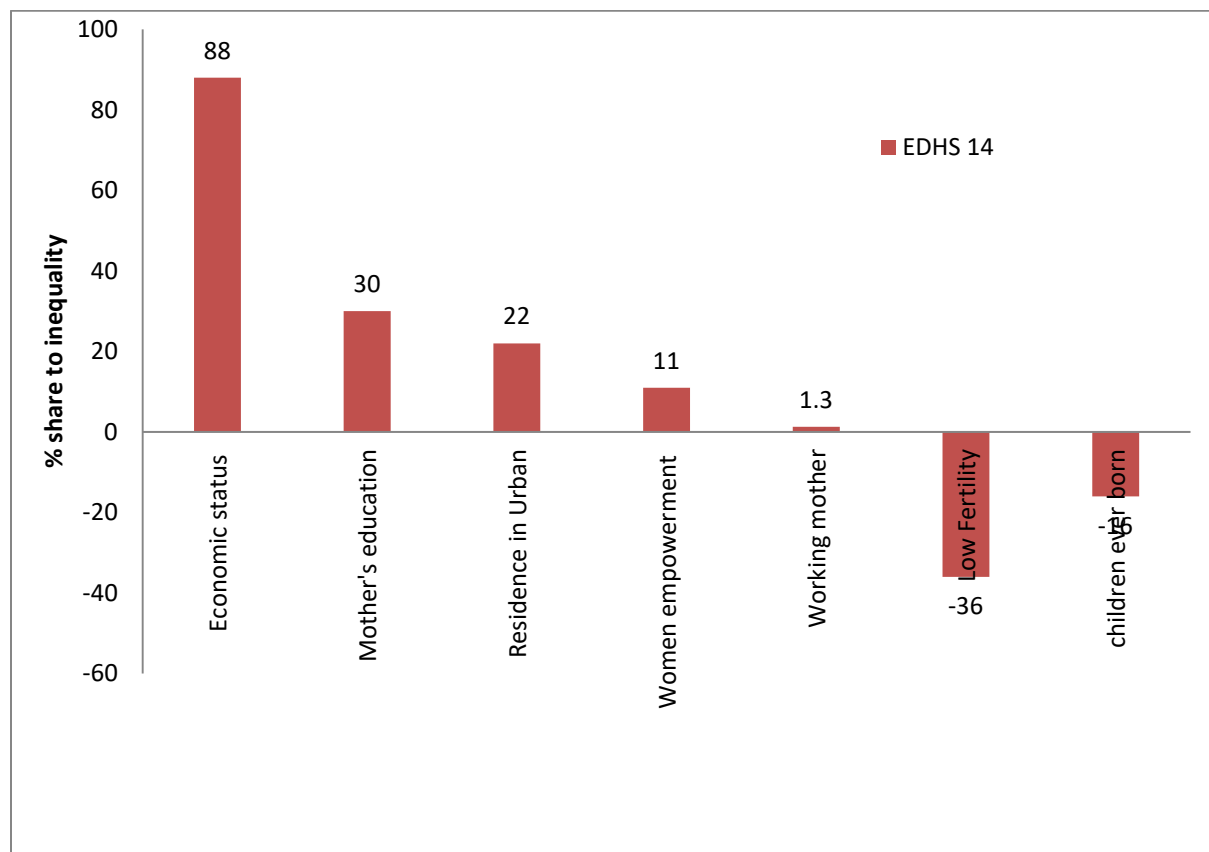

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Table (2) presents the decomposition estimates for low fertility inequality. The concentration index of low fertility equals 0.166 which means that low fertility is more concentrated among the rich households (pro-rich inequality). The results reveal that a higher percent contribution of households' economic status (69%) in socioeconomic inequality in low fertility was observed. Decomposition results indicate that 49 percent of socioeconomic inequality in low fertility was explained by mother's education. Additionally, place of resident (29 percent) was one of the contributors to socioeconomic inequality in low fertility. Further, current mother's age explained the observed inequality in low fertility by about – 26 percent.

Table (2): Decomposition results of inequality in low fertility in Egypt, EDHS 2014

Variable	β^m_k	CI_k	$\bar{x}_k$	elasticity	share	% share
Urban Residence	0.054	0.635	0.380	0.037	0.024	29
Mother'seducation (Higher[a])						
No education	-0.227	-0.619	0.253	-0.105	0.065	79
Primary	-0.257	-0.216	0.102	-0.048	0.010	12.7
secondary	-0.153	0.247	0.515	-0.143	-0.035	-43.2
Sum						49
Household economic status (Richest[a])						
Poorest	-0.136	-0.999	0.193	-0.048	0.048	59
Poorer	-0.077	-0.519	0.197	-0.028	0.014	18
Middle	-0.044	-0.012	0.210	-0.017	0.000	0.2
Richer	-0.031	0.512	0.206	-0.012	-0.006	-7
Sum						69
Current Mother's age	-0.045	0.009	28.52	-2.349	-0.021	-25.9
Total children ever born	0.023	-0.079	2.67	0.113	-0.009	-10.9
Currently pregnant	0.076	-0.055	0.09	0.013	-0.001	-0.9
Working mother	0.017	0.312	0.12	0.004	0.001	1.4
Women empowerment	0.016	0.299	0.74	0.021	0.006	8
Using Contraceptive	-0.093	0.166	0.546	-0.092	-0.015	-19
Total CI					0.166	

[a] Reference category   Source: Calculated by author from EDHS 2014.

The findings as summarized in Figure (2) highlight a disparity in the determinants of low fertility. Figure (2) reveals that the highest shares to socioeconomic inequality in low fertility are belonging to households' economic status (69%), mother's education (49%), urban residents (29%) and women empowerment (8%). While mother's age, using contraceptive method and total children ever born are negative contributors to low fertility inequality.

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Figure (2): Socioeconomic determinants of inequality in low fertility
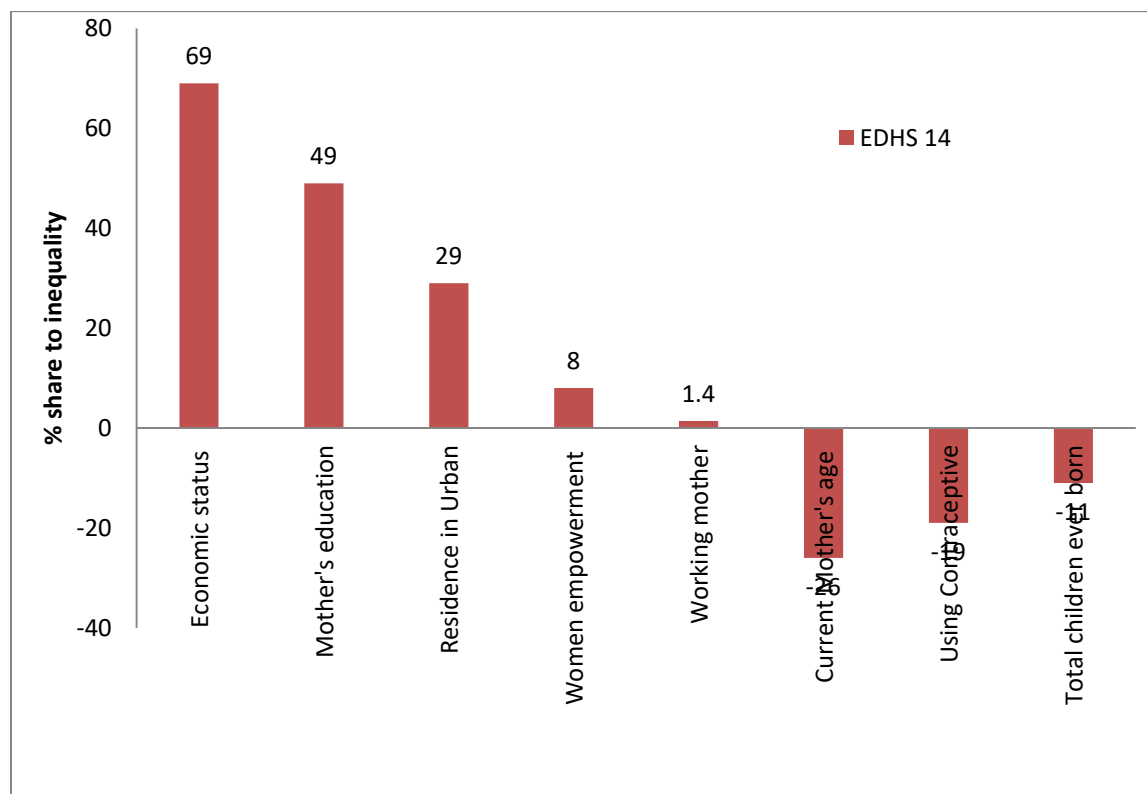
5. Discussion

Our research findings highlight that household wealth has been identified as the highest contributor to inequalities in low fertility and current contraceptive method use in Egypt. Consistent with these findings, a decomposition analysis performed by different researchers [6, 10, 12, 11, 13, 15, 16, 21, and 22] highlighted the presence of household wealth-related inequalities in current contraceptive utilization and decline fertility.
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Following wealth index, our analysis identifies mother's education as another significant factor contributing to socioeconomic disparities in declining fertility and contraceptive use [3, 15, 16, and 22]. This likely relates to educated women having greater access to family planning services and a deeper understanding of contraceptive options, as evidenced by Osmani et al. 2015 [12].

Our decomposition approach aligns with prior studies [4, 15, and 21] by revealing that the number of children in a household significantly contributes to socioeconomic disparities in contraceptive use. This aligns with findings like Sharma and Singh 2022 [15] who observed

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lower contraceptive use among women with no children compared to higher use among those with two or more.

Our research aligns with previous studies from different countries [3, 8, 12, 16, and 23] by demonstrating that a women's age is another contributor to inequality in low fertility and current contraceptive utilization. Younger women, often recently married and planning to have children, tend to utilize contraception less frequently. Conversely, older women who have likely reached their desired family size, as evidenced by Osmani et al. 2015 [12], demonstrate a significant increase in contraceptive use.

Consistent with previous studies [2, 6, 12, 15, 16, and 22] our analysis highlights that place of residence significantly contributes to socioeconomic inequality in low fertility and current contraceptive utilization in Egypt. This might be due to limited access to healthcare services and a lack of health information may be significant barriers for women in rural areas [1, and 17].

6. Conclusion

This paper explores the determinants that independently contribute more to the socioeconomic inequalities in current contraception usage and decline fertility among Egyptian women through a decomposition analysis. To achieve this goal, data from the 2014 Egypt Demographic and Health Survey (EDHS) was employed. Our analysis reveals that household wealth is the primary determinant of disparities in both current contraception usage and decline fertility. To reduce disparities in contraceptive use, targeted family planning programs should prioritize low-income households especially in rural areas.

This study identifies that mother's education is a key factor contributing to socioeconomic inequality in contraceptive use and declining fertility. To address these inequalities, expanding educational opportunities for women is crucial. This will not only promote greater contraceptive use but also enhance women's reproductive health knowledge and decision-making power [12]. Our findings indicate that current contraceptive utilization significantly contributes to socioeconomic inequality in low fertility. Future research may identify the interactive relationship with advanced methods between fertility and contraceptive use.

A limitation of this study is that it utilizes data from the 2014 EDHS survey, predating the more recent 2021 Egypt Demographic and Health Survey (DHS) by CAPMAS. Future research in this area could benefit from incorporating the latest DHS data to provide a more up-to-date picture of socioeconomic inequality in family planning indicators in Egypt.

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